

What Is Claimed Is:

1. Apparatus for filtering and entrapping debris from the vascular system of a patient, said apparatus comprising:

a filter device being sized to allow blood flow therethrough and to restrict passage of debris therethrough, and said filter device having a first given perimeter, a proximal side and a distal side; and

wherein said filtering device captures debris carried in a first direction of blood flow from said proximal side to said distal side thereof on said proximal side of said filter device;

an entrapment mechanism having a proximal side and a distal side, said entrapment mechanism including a selective opening to allow passage of debris and blood therethrough, said selective opening being configured to allow passage of blood and debris carried therein therethrough in said first direction of blood flow from said proximal side to said distal side of said entrapment mechanism, said selective opening having a restriction mechanism to prevent debris passage from

said distal side to said proximal side of said entrapment mechanism in a second direction opposite to said first direction, said selective opening forming a second given perimeter, and said first given perimeter and said second given perimeter being deployed within the vascular system so as to form a chamber between said distal side of said entrapment mechanism and said proximal side of said filtering device;

wherein said entrapment mechanism allows blood and debris carried therein therethrough in said first direction of blood flow, said filtering device allows blood therethrough in said first direction of blood flow, and said restriction mechanism prevents debris back through said selective opening in said second direction of blood flow opposite to said first direction of blood flow such that said chamber entraps the filtered debris received therein for debris removal from the vascular system of the patient.

2. Apparatus according to claim 1 further comprising an introduction mechanism including a cannula to insert said filter device and said

entrapment mechanism into the vascular system of the patient.

3. Apparatus according to claim 1 further comprising a deployable frame being selectively configurable to adjustably size said filter device and entrapment mechanism between a first position and a second position.

4. Apparatus according to claim 3 further comprising a compliant outer cuff being configured to surround said deployable frame, and to make contact with an inner wall of the vascular system of the patient.

5. Apparatus according to claim 4 wherein said compliant outer cuff passively surrounds said deployable frame.

6. Apparatus according to claim 4 wherein said compliant outer cuff is radially expandable.

7. Apparatus according to claim 1 wherein said filter device comprises a filter bag.

8. Apparatus according to claim 1 wherein said entrapment mechanism comprises at least one entrapment leaflet attached to a first portion on said distal side of said entrapment mechanism and contacting a second portion on said distal side of said entrapment mechanism such that said at least one entrapment leaflet is positioned away from said second distal surface of said entrapment mechanism to allow blood and debris in said first direction of blood flow therethrough and said at least one entrapment leaflet is positioned toward said second distal surface of said entrapment mechanism to prevent debris in said second direction of blood flow therethrough.

9. Apparatus according to claim 8 wherein said at least one entrapment leaflet comprises a filter material so as to allow blood, and to prevent debris, in said second direction of blood flow back through said entrapment mechanism.

10. Apparatus according to claim 8 wherein said at least one entrapment leaflet comprises a non-porous material so as to prevent blood and debris in said second direction of blood flow back through said entrapment mechanism.

11. Apparatus according to claim 8 further comprising a perimeter seal extending about the interior of said entrapment mechanism so as to provide selectable engagement with said at least one entrapment leaflet in said second direction of blood flow.

12. Apparatus according to claim 8 wherein said second portion of said entrapment mechanism is a piece of coarse mesh extending across the interior of said entrapment mechanism so as to provide selectable engagement with said at least one entrapment leaflet in said second direction of blood flow.

13. Apparatus according to claim 8 wherein said second portion of said entrapment mechanism is at least

one co-aptation strand extending across the interior of said entrapment mechanism so as to provide selectable engagement with said at least one entrapment leaflet in said second direction of blood flow.

14. Apparatus according to claim 1 wherein said first direction of blood flow is the direction of systolic blood flow and said second direction of blood flow is the direction of diastolic blood flow.

15. Apparatus according to claim 1 wherein said first direction of blood flow is the direction of diastolic blood flow and said second direction of blood flow is the direction of systolic blood flow.

16. A method for filtering and entrapping debris from the vascular system of a patient, said method comprising:

providing apparatus for filtering and entrapping debris from the vascular system of a patient, said apparatus comprising:

a filter device being sized to allow blood flow therethrough and to restrict passage of debris therethrough, and said filter device having a first given perimeter, a proximal side and a distal side; and

wherein said filtering device captures debris carried in a first direction of blood flow from said proximal side to said distal side thereof on said proximal side of said filter device;

an entrapment mechanism having a proximal side and a distal side, said entrapment mechanism including a selective opening to allow passage of blood and debris therethrough, said selective opening being configured to allow passage of blood and debris carried therein therethrough in said first direction of blood flow from said proximal side to said distal side of said entrapment mechanism, said selective opening having a restriction mechanism to prevent debris passage from said distal side to said proximal side of said entrapment mechanism in a second direction opposite to said first direction, said selective opening forming a second given perimeter, and said first given perimeter and said second given perimeter

being deployed within the vascular system so as to form a chamber between said distal side of said entrapment mechanism and said proximal side of said filtering device;

wherein said entrapment mechanism allows blood and debris carried therein therethrough in said first direction of blood flow, said filtering device allows blood therethrough in said first direction of blood flow, and said restriction mechanism prevents debris back through said selective opening in said second direction of blood flow opposite to said first direction of blood flow such that said chamber entraps the filtered debris received therein for debris removal from the vascular system of the patient;

inserting said apparatus into the vascular system of the patient; and

allowing blood and debris carried therein to flow through said entrapment mechanism, and into said chamber.

17. A method according to claim 16 further comprising the step of making an opening in a wall of a



portion of the vascular system prior to the step of inserting said apparatus into the vascular system of the patient wherein said apparatus is inserted through said opening.

18. A method according to claim 17 wherein the portion is the aorta of the patient.

19. A method according to claim 16 further comprising the step of removing said apparatus from the vascular system of the patient.

20. A method according to claim 16 wherein said apparatus maintains entrapment of debris during the step of removing said apparatus from the vascular system of the patient.